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CROSSTIES PURCHASED AND TREATED IN 1915.

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CROSSTIES PURCHASED, 1915.

Purchases of crossties were smaller in 1915 than in other years. The total number bought by all classes of purchasers was approximately 121,402,611. The inquiry covered steam railroads, electric railways, and light, heat, and power companies. No attempt was made to determine the prices paid for crossties, or the number of ties laid in new track, or to show separately the number of hewed and sawed ties purchased.

The information was obtained by the Forest Service entirely by means of correspondence; and the total number of ties reported by the purchasers of all classes who sent the information requested was 97,106,651. The estimated total of all purchases was obtained in the following manner: The actual number reported by steam railroads was 88,498,655. The mileage of roads so reporting amounted to 78.46 per cent of the total mileage of the country. Assuming that the nonreporting roads made purchases in proportion to their mileage, or 24,295,960 ties, the total for all steam railroads amounted to 112,794,615. To this is added the number purchased by electric railways and light, heat, and power companies, or 8,607,996, and the grand total for 1915 is estimated to be 121,402,611.

Table 1 shows the number of crossties purchased each year from 1907 to 1911, and for the year 1915, classified according to kinds of wood and arranged in the order of number purchased during 1915. The smallest number of ties reported purchased for any year since 1907 was in 1915. The figures in the table for 1911 and previous years were taken from reports prepared in cooperation with the Bureau of the Census. Statistics were not obtained for the years 1912, 1913, and 1914.

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Five kinds of wood supplied over 81 per cent of the total number of ties reported purchased in 1915. These were the oaks, southern pine, Douglas fir, cedar, and chestnut.

While there seems to be no trend toward the use of any one species, more oak was reported than any other kind of wood. This is doubtless due to the fact that oak has the requisite strength and hardness for ties and is available in many localities in large quantities. White oak is also desirable because of its durability, and red oak because satisfactory preservative treatment can be given it. Oak, including both red and white, supplied 49,333,881 ties, or 50.8 per cent of the total number reported purchased.

Yellow pine was second in importance, contributing 14,115,681 ties, or 13.43 per cent of the total number reported. This species is largely used because of its availability and cheapness, and, in the case of longleaf pine, its durability; the strength of longleaf pine adds to its desirability. Shortleaf and loblolly pine do not make altogether satisfactory ties, but are used largely because they are relatively cheap and take a satisfactory preservative treatment.

Table 1.—*Number of crossties reported purchased, 1907 to 1911 and 1915, by kinds of wood.*

Kind of wood.	1915	1911	1910	1909	1908	1907
All kinds	[1] 97,106,651	135,053,000	148,231,000	123,751,000	112,466,000	153,703,000
Oak	49,333,881	59,508,000	68,382,000	57,132,000	48,110,000	61,757,000
Southern pine	14,115,681	24,265,000	26,264,000	21,385,000	21,530,000	34,215,000
Douglas fir	6,950,910	11,253,000	11,629,000	9,067,000	7,988,000	14,525,000
Cedar	5,122,103	8,015,000	7,305,000	6,777,000	8,172,000	8,954,000
Chestnut	4,548,352	7,542,000	7,760,000	6,629,000	8,074,000	7,851,000
Cypress	4,478,612	5,857,000	5,396,000	4,589,000	3,457,000	6,780,000
Eastern tamarack	2,606,794	4,138,000	5,163,000	3,311,000	4,025,000	4,562,000
Western yellow pine	1,402,836	2,696,000	4,612,000	6,797,000	3,093,000	5,019,000
Lodgepole pine	1,316,819	....	....	....	....	....
Western larch	1,251,304	....	....	....	....	....
Beech	1,173,490	1,109,000	798,000	195,000	192,000	52,000
Maple	1,069,547	1,189,000	773,000	158,000	151,000	....
Hemlock	859,662	3,686,000	3,468,000	2,642,000	3,120,000	2,367,000
Redwood	563,685	1,820,000	2,165,000	2,088,000	871,000	2,032,000
Gum	485,466	1,293,000	1,621,000	378,000	262,000	15,000
Birch	465,815	....	....	....	....	....
All other	1,361,694	2,682,000	2,895,000	2,603,000	3,421,000	5,574,000

[1] Mileage of railroads reporting ties represent 78.46 per cent of total mileage. Mileage represented for former years not obtainable.

Individual quantities were not given for the number of western larch, lodgepole pine, and birch ties reported prior to 1915. It is probable that the figures for western yellow pine included those of lodgepole pine in former years. Larch might also have been tabulated with the tamarack statistics. In 1915 the number of lodgepole pine and western larch ties purchased was over a million each.

Table 2 shows the number of crossties reported purchased by the steam railroads, electric railways, and light, heat, and power companies. The total number of crossties reported purchased during 1915 by the steam railroads was 88,498,655, or 91.13 per cent of the total reported by all classes of purchasers. White and red oak and southern pine furnished the greater part of these, although Douglas fir and cedar were reported in large quantities.

The number of ties purchased by the electric railways and light, heat, and power companies amounted to 8.87 per cent of the total, a decrease of 281,000 ties in comparison with the number purchased by these companies in 1911. The greater part of those reported were white oak, cedar, and chestnut. Southern pine and red-oak ties were purchased in nearly the same quantities, while fewer birch ties than any other were separately reported.

TABLE 2.—*Number of crossties reported purchased in 1915, by classes of purchasers and kinds of wood.*

Kind of wood.	Total.	Steam railroads representing 78.46 per cent of entire mileage in the United States.	Electric railways, and light, heat, and power companies.
All kinds	97,106,651	88,498,655	8,607,996
White oak	32,461,555	30,160,316	2,301,239
Red oak	16,872,326	15,989,605	882,721
Southern pine	14,115,681	13,226,654	889,027
Douglas fir	6,950,910	6,308,685	642,225
Cedar	5,122,103	4,121,570	1,000,533
Chestnut	4,548,352	2,666,402	1,881,950
Cypress	4,478,612	4,375,012	103,600
Eastern tamarack	2,606,794	2,520,475	86,319
Western yellow pine	1,402,836	1,183,535	219,301
Lodgepole pine	1,316,819	1,254,420	62,399
Western larch	1,251,304	1,196,415	54,889
Beech	1,173,490	1,139,457	34,033
Maple	1,069,547	1,062,086	7,461
Hemlock	859,662	839,924	19,738
Redwood	563,685	270,694	292,991
Gum	485,466	485,466	....
Birch	465,815	462,462	3,353
All other	1,361,694	1,235,477	126,217

Table 3 shows the number of crossties reported purchased by the steam railroads, representing 78.46 per cent of the total mileage of the country, classified by regions which are the same as those used by the Interstate Commerce Commission.

The eastern region comprises that portion of the United States bounded on the west by the northern and western shores of Lake Michigan to Chicago, thence by a line to Peoria, thence to East St. Louis, and down the Mississippi River to the mouth of the Ohio River. It is bounded on the south by the Ohio River from its mouth to Parkersburg, W. Va.; thence down the Potomac River to its mouth. This region is second in size of the three regions and has a total of 64,491 miles of railroad. The actual mileage of the reporting railroads is 43,018 miles, or 66 per cent of the total mileage of the region.

The southern region is that portion of the United States bounded on the north by the eastern region and on the west by the Mississippi River. It is the smallest of the three regions and has a total of

49,670 miles of railroads. The mileage of the reporting railroads was 35,830 miles, or 72 per cent of the total mileage of the region.

The western region, which is the largest, is the remainder of the United States and has a total of 141,936 miles of railroads. The mileage of the reporting railroads is 122,432 miles, or 86 per cent of the total of the region.

White oak is the predominating wood in all regions. It is very evenly distributed throughout them all; and the southern and eastern regions reported practically the same quantities. Practically all of the red-oak ties were reported in the western and eastern regions, the southern region reporting only 512,054. Southern pine is rather evenly distributed through all the different regions.

Oak, Douglas fir, and southern pine meet the greater part of the demand in the western region, although cypress, cedar, tamarack, western yellow pine, and lodgepole pine are well represented.

The eastern region draws largely upon oak, southern pine, cedar, and chestnut for its crossties. These four species supplied 27,681,334, or 92 per cent of the total number of ties purchased in this region. Douglas fir was purchased in small quantities, the total being 2,491 ties.

In the southern region, white oak, southern pine, and cypress contributed 16,096,815 ties, or 90 per cent of the total purchased in the region. There were reported 432 hemlock crossties and only 27 cedar ties. Beech and maple were reported in nearly equal quantities.

TABLE 3.—*Number of crossties reported purchased in 1915 by steam railroads, representing 78.46 per cent of total mileage, by regions and kinds of wood.*

Kind of wood.	Total.	Western region.	Eastern region.	Southern region.
All kinds	88,498,655	40,650,424	30,007,583	17,840,648
White oak	30,160,316	11,227,462	9,336,366	9,596,488
Red oak	15,989,605	5,680,237	9,797,314	512,054
Southern pine	13,226,654	4,692,350	3,922,080	4,612,224
Douglas fir	6,308,685	6,306,194	2,491	....
Cypress	4,375,012	2,467,158	19,751	1,888,103
Cedar	4,121,570	2,004,822	2,116,721	27
Chestnut	2,666,402	96,443	2,508,853	61,103
Eastern tamarack	2,520,475	2,408,642	111,833	....
Lodgepole pine	1,254,420	1,254,420	....	....
Western larch	1,196,415	1,196,415	....	....
Western yellow pine	1,183,535	1,145,371	3,364	34,800
Beech	1,139,457	118,363	648,774	372,320
Maple	1,062,086	111,400	578,373	372,313
Hemlock	839,924	811,822	27,670	432
Gum	485,466	275,741	208,550	1,175
Birch	462,462	194,801	267,661	....
Redwood	270,694	270,694	....	....
All other	1,235,477	388,089	457,782	389,606

Table 4 indicates the number of crossties purchased by the various classes of railroads. Class I roads are those whose annual operating revenues are over $1,000,000; Class II, from $100,000 to $1,000,000; and Class III, under $100,000. The railroads in Class I represent 183,493 miles; those in Class II and Class III represent 9,587 miles and 8,200 miles respectively. The total mileage of the reporting railroads in these three classes is 201,280 miles, or 78.46 per cent of the total mileage of the steam railroads in the United States. The mileage of the reporting railroads in Class I constitutes over 71 per cent of the entire mileage of the country. It is also over 80 per cent of the mileage of Class I roads.

TABLE 4.—*Number of crossties reported purchased in 1915 by steam railroads, representing 78.46 per cent of total mileage in all regions by classes and kinds of wood.*

Kind of wood.	Total.	Class I.—Operating revenues, over $1,000,000.	Class II.—Operating revenues, $100,000–$1,000,000.	Class III.—Operating revenues, under $100,000.
All kinds	88,498,655	81,362,505	3,641,978	3,494,172
White oak	30,160,316	27,557,928	1,321,443	1,280,945
Red oak	15,989,605	15,495,614	166,023	327,968
Southern pine	13,226,654	11,697,745	877,836	651,073
Douglas fir	6,308,685	5,964,527	212,991	131,167
Cypress	4,375,012	3,934,789	256,282	183,941
Cedar	4,121,570	3,672,564	202,126	246,880
Chestnut	2,666,402	2,323,586	117,722	225,094
Eastern tamarack	2,520,475	2,390,333	91,799	38,343
Lodgepole pine	1,254,420	1,201,347	23,340	29,733
Western larch	1,196,415	1,136,944	36,874	22,597
Western yellow pine	1,183,535	1,057,841	10,010	115,684
Beech	1,139,457	1,096,095	15,884	27,478
Maple	1,062,086	1,021,603	13,719	26,764
Hemlock	839,924	650,774	128,475	60,675
Gum	485,466	475,263	904	9,299
Birch	462,462	455,881	6,581	....
Redwood	270,694	162,184	67,212	41,298
All other	1,235,477	1,067,487	92,757	75,233

Tables 5, 6, and 7 show the number of crossties purchased by the steam railroads in the western, eastern, and southern regions of the country. They are tabulated according to the three classes of roads and the species are arranged in the order of number of ties purchased.

TABLE 5.—*Number of crossties reported purchased in 1915 by steam railroads representing 86.54 per cent of the mileage in the western region, by classes of railroads and kinds of wood.*

Kind of wood.	Total.	Class I.—Operating revenues, over $1,000,000.	Class II.—Operating revenues, $100,000–$1,000,000.	Class III.—Operating revenues, under $100,000.
All kinds	40,650,424	37,425,087	1,775,397	1,449,940
White oak	11,227,462	10,027,038	602,737	597,687
Red oak	5,680,237	5,516,065	62,178	101,994
Douglas fir	6,306,194	5,964,527	210,500	131,167
Southern pine	4,692,350	4,345,555	176,836	169,959
Cypress	2,467,158	2,303,909	148,352	14,897
Eastern tamarack	2,408,642	2,334,141	46,346	28,155
Cedar	2,004,822	1,716,987	191,099	96,736
Lodgepole pine	1,254,420	1,201,347	23,340	29,733
Western larch	1,196,415	1,136,944	36,874	22,597
Western yellow pine	1,145,371	1,057,841	10,010	77,520
Hemlock	811,822	633,277	121,686	56,859
Gum	275,741	267,563	704	7,474
Redwood	270,694	162,184	67,212	41,298
Birch	194,801	194,801	....	....
Beech	118,363	112,363	....	6,000
Maple	111,400	103,417	1,137	6,846
Chestnut	96,443	92,944	....	3,499
All other	388,089	354,184	76,386	57,519

TABLE 6.—*Number of crossties reported purchased in 1915 by steam railroads representing 66.24 per cent of the mileage in the eastern region, by classes of railroads and kinds of wood.*

Kind of wood.	Total.	Class I.—Operating revenues, over $1,000,000.	Class II.—Operating revenues, $100,000–$1,000,000.	Class III.—Operating revenues, under $100,000.
All kinds	30,007,583	28,365,491	615,807	1,026,285
Red oak	9,797,314	9,511,011	77,926	208,377
White oak	9,336,366	8,810,429	308,817	221,120
Southern pine	3,922,080	3,727,961	22,315	171,804
Chestnut	2,508,853	2,201,641	102,198	205,014
Cedar	2,116,721	1,955,577	11,000	150,144
Beech	648,774	613,016	15,780	19,978
Maple	578,373	547,471	12,582	18,320
Birch	267,661	261,080	6,581	....
Gum	208,550	207,700	....	850
Eastern tamarack	111,833	56,192	45,453	10,188
Hemlock	27,670	17,497	6,789	3,384
Cypress	19,751	14,763	....	4,988
Western yellow pine	3,364	....	....	3,364
Douglas fir	2,491	....	2,491	....
All other	457,782	441,153	7,875	8,754

TABLE 7.—*Number of crossties reported purchased in 1915 by steam railroads representing 72.13 per cent of the mileage in the southern region, by classes of railroads and kinds of wood.*

Kind of wood.	Total.	Class I.—Operating revenues, over $1,000,000.	Class II.—Operating revenues, $100,000–$1,000,000.	Class III.—Operating revenues, under $100,000.
All kinds	17,840,648	15,571,927	1,250,774	1,017,947
White oak	9,596,488	8,720,461	413,889	462,138
Southern pine	4,612,224	3,624,229	678,685	309,310
Cypress	1,888,103	1,616,117	107,930	164,056
Red oak	512,054	468,538	25,919	17,597
Beech	372,320	370,716	104	1,500
Maple	372,313	370,715	....	1,598
Chestnut	61,106	29,001	15,524	16,581
Western yellow pine	34,800	....	....	34,800
Gum	1,175	....	200	975
Hemlock	432	....	....	432
Cedar	27	....	27	....
All other	389,606	372,150	8,496	8,960

PRESERVATION.

The deterioration of crossties in the United States by preventable decay uses up a great deal of timber. By adopting methods of preventing decay and using devices which retard wear, the quantity of wood consumed annually for this purpose could be greatly decreased.

There are many different causes of deterioration which necessitate the renewal of ties, the principal ones being decay, mechanical wear, breakage, insect attack, splitting, etc. In recent years the railroads have been prolonging the life of their ties by the use of preservatives, principally zinc chloride and creosote oils. By these means a number of species have been made available for ties which heretofore were unfitted for this purpose because they did not have the proper decay-resisting qualities or immunity from insect attacks. Such treatment is often economical even with the woods that are more or less durable, the added life in service more than paying for the increase in the first cost.

Most of the crossties treated by the steam railroads in the United States are treated in closed cylinders permitting the application of a high pressure and designed to secure a heavy absorption of the preservative.

The schedules furnished to the steam and electric railroads did not request information as to the number of ties treated in 1915, but the Forest Service gathered statistics for this year from all of the treating plants in the United States. Table 8 shows the number of ties treated by the preserving plants during 1915, by kinds of preservatives and kinds of wood.

Table 8.—*Number of crossties treated by preserving plants during 1915, by kinds of preservatives and kinds of wood.*

Kind of wood.	Total.	Zinc chloride.	Creosote.	Zinc chloride and creosote.	Miscellaneous.
All kinds	37,085,585	17,819,284	17,077,069	2,182,712	6,520
Oak	16,885,517	7,954,492	7,365,673	1,565,352	
Southern pine	8,541,203	3,257,565	5,243,516	40,122	
Douglas fir	3,553,854	2,760,952	787,247		5,655
Beech	2,933,737	100,000	2,469,202	364,535	
Western pine [1]	2,007,609	1,702,167	301,581	3,861	
Tamarack [2]	932,038	449,660	390,017	91,496	865
Gum	277,886	204,653	1,650	71,583	
Birch	173,971	55	173,916		
Elm	50,846	50,846			
Maple	36,942	316	36,626		
All other	1,691,982	1,338,578	307,641	45,763	

[1] Includes lodgepole pine and western yellow pine.

[2] Includes western larch.

Since railroads often purchase large quantities of ties in one calendar year which do not receive preservative treatment until one or more years following, it is impossible to harmonize the data showing purchases with those showing preservative treatment. Furthermore, some treated ties reported in Table 8 may have been purchased by those roads which failed to report.

The treating plants reported a total of 37,085,585 crossties treated in 1915, which is about 38 per cent of the total number of ties reported purchased during that year. Of the total number of ties treated in 1915, 25,831,204 were hewed ties and 11,254,381 were sawed ties.

Oak ties were treated in larger numbers than any other species, contributing about 45 per cent of the total number treated. Southern pine was second in importance, constituting about 23 per cent of the total treated. Other species reported treated were Douglas fir, beech, western pine, tamarack, gum, birch, elm, and maple. There were also treated a few miscellaneous ties, chiefly cypress, ash, sycamore, locust, and hickory.

Zinc chloride was the principal preservative used. Large quantities of creosote were also consumed in the treatment of ties. Zinc chloride and creosote in combination treated 2,182,712 ties, of which over 50 per cent were oak. The miscellaneous preservatives were used principally for Douglas fir and tamarack.

In treating ties with zinc chloride the average injection of the preservative was 0.5 pound per cubic foot, while with creosote oil the average quantity used was 8.5 pounds per cubic foot.

The practice of treating wood has increased because of the economic necessity of less frequent renewals of timber subject to decay. Prior to 1900 the wood-preserving industry developed slowly, and only during the last 10 or 15 years has it gained a permanent foothold in the United States. From a total of 12 plants in 1900 the industry has grown until at the present time there are 128 plants in commercial operation. Of this number 95 are pressure plants, 27 are nonpressure plants, and 6 are equipped for both pressure and nonpressure treatment. The industry in this country has been built up largely on crossties and other railroad material. Of the total quantity of 141,858,963 cubic feet of material of all kinds treated with preservatives in 1915, a little more than 78 per cent was crossties.

The number of ties treated each year, beginning with 1909, is shown in Table 9, together with the quantity of ties reported purchased.

TABLE NO. 9.—*Number of crossties reported purchased and treated, by years.*

Year.	Reported purchased.	Reported treated.
1909	123,751,000	20,693,013
1910	148,231,000	26,155,677
1911	135,053,000	28,394,140
1912	(1)	32,394,336
1913	(1)	40,260,416
1914	(1)	43,846,987
1915	97,106,651	37,085,585

[1] Statistics for these years not obtained.

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